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EXAMINER	
SUCH, MATTHEW W	

ART UNIT	PAPER NUMBER
2891	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/540,279	LEE ET AL.	
	Examiner	Art Unit	
	MATTHEW W. SUCH	2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *See Continuation Sheet* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-42,82,83,95,96,110-114,148-152,155-162,170,172,177,180-183,187 and 189* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *21 June 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims pending in the application are 1-42,82,83,95,96,110-114,148-152,155-162,170,172,177,180-183,187 and 189.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 21 June 2005 is being considered by the examiner.

Specification

2. The disclosure is objected to because of the following informalities: the word "chromaphore" on Page 55, Line 21 should read "chromophore".

Appropriate correction is required.

Claim Objections

3. Claim 30 is objected to because of the following informalities: the claim is missing a period at the end of the sentence. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 42, 110-111, 172, 180 and 183 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims recites i) at least one donor member

for receiving conduction electrons from an electron donor; ii) at least one acceptor member for communicating with an electron acceptor to provide a region of attraction for said conduction electrons. It is unclear from the language of the claim as to whether the donor member is an electron donor (an electron source) or is a member to which electrons are donated and whether the acceptor member is an electron acceptor (a hole source) or is a member from which electrons are accepted. Furthermore, the language of the claim is further ambiguous because it appears that each of "i)" and "ii)" both have the same functionality – the "at least one donor member" is established by the claim to be capable of receiving conduction electrons and the "at least one acceptor member" is established by the claim to be capable of attraction for conduction electrons.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-42, 82-83, 95-96, 110-114, 148-152, 155-162, 170, 172, 177, 180-183, 187 and 189 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee (`317).

The applied reference has a common inventor/assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing

under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

a. Regarding claim 1, Lee teaches an organic circuit element comprising a plurality of members (Elements 104, 108, 106, 120, 140, 160), each comprising an oligonucleotide duplex (Para. 0144, at least). The plurality of members comprises at least one donor member (Element 104, 160) for receiving conduction electrons from an electron donor, at least one acceptor member (Element 106, 140) for communicating with an electron acceptor to provide a region of attraction for said conduction electrons and at least one regulator member (Element 108, 120) intersecting with at least one of said plurality of members (see Fig. 1, for example) to define at least one electric field regulation junction (Element 180), for cooperating with an electric field regulator to regulate an electric field at the junction and wherein the electron donor or electron acceptor are adapted to be reversibly chemically modified to alter the conductivity of the organic circuit element under conditions that preserve the conductivity of the circuit element.

Regarding the recitations of "for receiving conduction electrons from an electron donor", "for communicating with an electron acceptor to provide a region of attraction for said conduction electrons" and "to define at least one electric field regulation junction, for cooperating with an electric field regulator to regulate an electric field at the junction and wherein the electron donor or electron acceptor are adapted to be reversibly chemically modified to alter the conductivity of the organic circuit element under conditions that

preserve the conductivity of the circuit element", the manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) See MPEP § 2114. The aforementioned recitations are intended use language which does not differentiate the claimed device from the prior art device of Lee, who teaches the structure as well as the functionality of the claim as described above.

b. Regarding claim 2, Lee teaches that at least some of the members comprise a conductive-metal containing oligonucleotide complex (Para. 0144, at least).

c. Regarding claim 3, Lee teaches that each of the members comprise a conductive-metal containing oligonucleotide complex (Para. 0144, at least).

d. Regarding claim 4, Lee teaches that each of the at least one donor member and at least one acceptor member comprises a conductive-metal containing oligonucleotide complex (Para. 0144, at least).

e. Regarding claim 5, Lee teaches the electron donor (Element 200) in electrical communication with the donor member.

f. Regarding claim 6, Lee teaches the electron acceptor (Element 220) in electrical communication with the acceptor member.

g. Regarding claim 7, Lee teaches the electric field regulator (Element 240) in electrical communication with the regulator member.

h. Regarding claim 8, Lee teaches the electron donor (Element 200) in electrical communication with the donor member and the electron acceptor (Element 220) in electrical communication with the acceptor member.

i. Regarding claim 9, Lee teaches that the donor member, acceptor member and regulator member intersect (see Fig. 1, for example) to define the electric field regulation junction (Element 108).

j. Regarding claim 10, Lee teaches that the regulator member intersects with one of the donor member and acceptor member (see Fig. 1, for example) to define the electric field regulation junction (Element 108).

k. Regarding claim 11, Lee teaches that the plurality of members comprises a common member (Element 1302) and wherein the donor member, acceptor member, and regulator member intersect the common member at first (Element 1320), second

(Element 1340), and third (Element 1380) locations, respectively, the third location defining the electric field regulation junction (Element 1380, see Fig. 9, for example).

l. Regarding claim 12, Lee teaches that the plurality of members comprises a plurality of regulator members (each of the regulators shown in Elements 1220, 1222) intersecting other respective members of the plurality of members to define at least one electric field regulation junction (Element 180, see Fig. 8, for example).

m. Regarding claim 13, Lee teaches that the conductive metal-containing oligonucleotide duplex comprises a first nucleic acid strand and a second nucleic acid strand, the first strand and second strand comprising respective pluralities of nitrogen-containing aromatic bases covalently linked by a backbone, the nitrogen-containing aromatic bases of the first strand being joined by hydrogen bonding to the nitrogen-containing aromatic bases of the second strand, forming hydrogen bonded based pair in stacked arrangement along a length of the duplex, the hydrogen-bonded base pair comprising an interchelated metal cation coordinated to a nitrogen atom in one of the nitrogen-containing aromatic bases (see Para. 0044, at least; also Figs. 2-4).

n. Regarding claim 14, Lee teaches that the interchelated metal cation comprises an interchelated divalent metal cation (see Para. 0045, for example).

o. Regarding claim 15, Lee teaches that the divalent metal cation is one of zinc, cobalt and nickel (see Para. 0049, for example).

p. Regarding claim 16, Lee teaches the metal cation is selected from the group consisting of the cations of Li, Be, Na, Mg, Al, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Cs, Ba, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, TI, Pb, Bi, Po, Fr, Ra, Ac, Th, Pa, U, Np and Pu (see Para. 0050, for example).

q. Regarding claim 17, Lee teaches that the first and second strands comprise deoxyribonucleic acid and the nitrogen-containing aromatic bases are selected from adenine, thymine, guanine and cytosine (see Para. 0043, for example).

r. Regarding claim 18, Lee teaches that the divalent metal cations are substituted for imide protons of the nitrogen-containing aromatic bases, which are selected from thymine and guanine (see Para. 0051).

s. Regarding claim 19, Lee teaches that at least one of the nitrogen-containing aromatic bases comprises thymine, having an N3 nitrogen atom, and the divalent metal cation is coordinated by the N3 atom (see Para. 0052).

t. Regarding claim 20, Lee teaches that at least one of the nitrogen-containing aromatic bases comprises guanine, having an N1 nitrogen atom, and the divalent metal cation is coordinated by the N1 atom (see Para. 0053).

u. Regarding claim 21, Lee teaches that the electron donor comprises an electrode (see Para. 0057 and 0170; Element 202) which is operable to donate an electron to the donor member. Regarding the recitation of "operable to donate an electron to said donor member", the manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114. The aforementioned recitation are intended use language which does not differentiate the claimed device from the prior art device of Lee, who teaches the structure as well as the functionality of the claim as described above.

v. Regarding claim 22, Lee teaches that the electron acceptor comprises an electrode (see Para. 0058 and 0170; Element 222) which is operable to donate an electron to the acceptor member. Regarding the recitation of "operable to accept an electron to said acceptor member", the manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed

apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114. The aforementioned recitation are intended use language which does not differentiate the claimed device from the prior art device of Lee, who teaches the structure as well as the functionality of the claim as described above.

w. Regarding claim 23, Lee teaches that the electron donor comprises an electron donor molecule capable of donating an electron to the donor member (Para. 0054).

x. Regarding claim 24, Lee teaches that the electron donor molecule comprises a fluorescent molecule (Para. 0055).

y. Regarding claim 25, Lee teaches that the electron donor molecule comprises a fluorescein (Para. 0055).

z. Regarding claim 26, Lee teaches that the electron acceptor comprises an electron acceptor molecule capable of accepting an electron to the acceptor member (Para. 0054).

aa. Regarding claim 27, Lee teaches that the electron acceptor molecule comprises a fluorescent molecule (Para. 0056).

bb. Regarding claim 28, Lee teaches that the electron acceptor molecule comprises rhodamine (Para. 0056).

cc. Regarding claim 29, Lee teaches that the electric field regulator comprises a regulator chromophore (see Para. 0060).

dd. Regarding claim 30, Lee teaches that the electric field regulator comprises a fluorescent molecule (Para. 0059).

ee. Regarding claim 31, Lee teaches that the electric field regulator comprises fluorescein (Para. 0059).

ff. Regarding claim 32, Lee teaches that the electric field regulator comprises rhodamine (Para. 0059).

gg. Regarding claim 33, Lee teaches that the regulator chromophore absorbs radiation with a range of wavelengths (Para. 0060).

hh. Regarding claim 34, Lee teaches that the electron acceptor comprises a chromophore operable to emit radiation within a range of wavelengths in response to accepting an electron from the acceptor member (Para. 0061).

ii. Regarding claim 35, Lee teaches that the electric field regulator comprises an electrode (see Para. 0063 and 0170; Element 242).

jj. Regarding claim 36, Lee teaches that the electric field regulator comprises a plurality of states, each state of the plurality of states being selectable to production a respective electrostatic potential at the electric field regulation junction (Para. 0064). Regarding the recitation of "the electric field regulator comprises a plurality of states, each state of the plurality of states being selectable to production a respective electrostatic potential at the electric field regulation junction", the manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114. The aforementioned recitation are intended use language which does not differentiate the claimed device from the prior art device of Lee, who teaches the structure as well as the functionality of the claim as described above.

kk. Regarding claim 37, Lee teaches that the states are selectable in response to an applied external potential (see Para. 0069). Regarding the recitation of "the states are selectable in response to an applied external potential", the manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a

"recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114. The aforementioned recitation are intended use language which does not differentiate the claimed device from the prior art device of Lee, who teaches the structure as well as the functionality of the claim as described above.

ll. Regarding claim 38, Lee teaches a system comprising the organic circuit element and further comprises a conductive medium for supplying conduction electrons to the electron donor and for receiving conduction electrons from the electron acceptor (Para. 0032). Regarding the recitation of "for supplying conduction electrons to the electron donor and for receiving conduction electrons from the electron acceptor", the manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114. The aforementioned recitation are intended use language which does not differentiate the claimed device from the prior art device of Lee, who teaches the structure as well as the functionality of the claim as described above.

mm. Regarding claim 39, Lee teaches that the conductive medium is operable to donate electrons to the electron donor, and is operable to accept electrons from the electron acceptor to provide a closed circuitway for electrons to flow from the electron donor, through the donor member, through the electric field regulation junction, through the acceptor member, through the electron acceptor, and back to the electron donor (see Para. 0033). Regarding the recitation of "said conductive medium is operable to donate electrons to said electron donor, and is operable to accept electrons from said electron acceptor to provide a closed circuitway for electrons to flow from said electron donor, through said donor member, through said electric field regulation junction, through said acceptor member, through said electron acceptor, and back to said electron donor", the manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114. The aforementioned recitation are intended use language which does not differentiate the claimed device from the prior art device of Lee, who teaches the structure as well as the functionality of the claim as described above.

nn. Regarding claim 40, Lee teaches that the conductive medium comprises an aqueous solution (see Para. 0034).

oo. Regarding claim 41, Lee teaches that the conductive medium comprises a conductive wire (see Para. 0034).

pp. Regarding claim 42, Lee teaches a method of making an organic circuit element comprising annealing and treating a plurality of oligonucleotides to form a plurality of members (Para. 0035), the plurality of members comprising a pair of the oligonucleotides aligned to form a duplex portion, the plurality of members comprising at least one donor member (Element 104, 160) for receiving conduction electrons from an electron donor, at least one acceptor member (Element 106, 140) for communicating with an electron acceptor to provide a region of attraction for said conduction electrons and at least one regulator member (Element 108, 120) intersecting with at least one of said plurality of members (see Fig. 1, for example) to define at least one electric field regulation junction (Element 180; see also Para. 0035).

qq. Regarding claim 82, Lee teaches a method of regulating an electronic signal between first and second locations in a conductive nucleic acid material, the method comprising varying an electrostatic potential at a third location in the nucleic acid material interposed between the first and second locations (Para. 0065).

rr. Regarding claim 83, Lee teaches that varying comprises selecting one of a plurality of states of an electric field regulator in communication with the third location,

each of the states corresponding to a respective electrostatic potential at the third location (Para. 0066).

ss. Regarding claim 95, Lee teaches that the first location comprises a location in a conductive nucleic acid electron donor member (Element 104), the second location comprises a location in a conductive nucleic acid electron acceptor member (Element 102), and the third location comprises at least one electric field regulation junction (Element 180) in electrical communication with the donor member and the acceptor member, and varying comprising varying the electrostatic potential at the at least one electric field regulation junction (see Para. 0067-0074).

tt. Regarding claim 96, Lee teaches that the at least one electric field regulation junction is in electrical communication with a conductive nucleic acid electric field regulator member (see Para. 0074 and Fig. 1, for example) and the varying comprises selecting one of a plurality of states of an electric field regulator in electrical communication with the regulator member, each of the states corresponding to a respective electrostatic potential at the at least one electric field regulation junction (see Para. 0074).

uu. Regarding claim 110, Lee teaches that the conductive nucleic acid material comprises a plurality of members, each of which comprises a conductive metal-containing oligonucleotide duplex, said plurality of members comprising at least one

donor member (Element 102) for receiving conduction electrons from an electron donor, at least one acceptor member (Element 106) for communicating with an electron acceptor to provide a region of attraction for said conduction electrons, and at least one regulator member (Element 108) intersecting with at least one of said plurality of members to define at least one electric field regulation junction (Element 180), for cooperating with an electric field regulator to regulate an electric field at the junction; and wherein varying comprises selecting one of a plurality of states of the electric field regulator, each of the states corresponding to a respective electrostatic potential at the electric field regulation junction (Para. 0074, for example).

vv. Regarding claim 111, Lee teaches that the conductive nucleic acid material comprises a conductive metal-containing nucleic acid duplex, said conductive metal-containing nucleic acid duplex comprising a regulator member in electrical communication with an electric field regulator (Element 108, 120, 240), a donor member in electrical communication with an electron donor (Element 104, 160, 200), and an acceptor member in electrical communication with an electron acceptor (Element 106, 140, 220), and wherein varying comprises changing a state of said electric field regulator to vary an electrostatic potential at a electric field regulation junction joining said regulator member, said donor member, and said acceptor member, to regulate the signal (see Para. 0067-0074).

ww. Regarding claim 112, Lee teaches that the conductive metal-containing nucleic acid duplex comprises a nucleic acid duplex comprising a first nucleic acid strand and a second nucleic acid strand, the first and second nucleic acid strands comprising respective pluralities of nitrogen-containing aromatic bases covalently linked by a backbone, the nitrogen- containing aromatic bases of the first nucleic acid strand being joined by hydrogen bonding to the nitrogen-containing aromatic bases of the second nucleic acid strand, the nitrogen-containing aromatic bases on the first and second nucleic acid strands forming hydrogen-bonded base pairs in stacked arrangement along a length of the nucleic acid duplex (see Para. 0044, at least; also Figs. 2-4).

xx. Regarding claim 113, Lee teaches producing the conductive metal-containing nucleic acid duplex (see Para. 0040-0041).

yy. Regarding claim 114, Lee teaches that the producing comprises subjecting the nucleic acid duplex to a basic solution in the presence of a metal cation under conditions effective to form the conductive metal-containing nucleic acid duplex, wherein the hydrogen- bonded base pairs of the conductive metal-containing nucleic acid duplex comprise an interchelated metal cation coordinated to a nitrogen atom in one of the nitrogen-containing aromatic bases (see Para. 0046-0049).

zz. Regarding claim 148, Lee teaches an apparatus for regulating an electronic signal between first and second locations in a conductive nucleic acid material comprising the

conductive nucleic acid material having first and second locations (Elements 104, 160, 200, 202 and 106, 140, 220, 222) and a means for (Element 108, 120, 240, 242) varying an electrostatic potential at a third location (Element 180) in the nucleic acid material interposed between the first and second locations. The language of "means for" introduces language for interpretation under 35 U.S.C. 112, sixth paragraph. The specification teaches the regulator member as a structure with function set forth by the claim, which is taught by Lee, as shown.

aaa. Regarding claim 149, Lee teaches that the means for varying comprises means for selecting one of a plurality of states of an electric field regulator in communication with the third location, each of the states corresponding to a respective electrostatic potential at the third location (see Para. 0064-0066).

bbb. Regarding claim 150, Lee teaches that the means for selecting comprises means for irradiating the electric field regulator (Para. 0067).

ccc. Regarding claim 151, Lee teaches that the means for selecting comprises means for applying and external potential to the electric field regulator (Para. 0064-0065).

ddd. Regarding claim 152, Lee teaches that the electric field regulator comprises an electrode (Element 242), and wherein the means for applying comprises means for

depositing at least one electrode onto the electrode to apply a negative electrostatic potential to the third location (see Para. 0064).

eee. Regarding claim 155, Lee teaches that the first location comprises a location in a conductive nucleic acid electron donor member (Element 104), the second location comprises a location in a conductive nucleic acid electron acceptor member (Element 106), and the third location comprises at least one electric field regulation junction (Element 180) in electrical communication with the donor member and the acceptor member, and wherein the means for (Element 108) varying comprises means for varying the electrostatic potential at the at least one electric field regulation junction.

fff. Regarding claim 156, Lee teaches that the at least one electric field regulation junction is in electrical communication with a conductive nucleic acid electric field regulator member (Element 120), and wherein the means for varying comprises means for selecting one of a plurality of states of an electric field regulator in electrical communication with the regulator member, each of the states corresponding to a respective electrostatic potential at the at least one electric field regulation junction (Para. 0064-0066).

ggg. Regarding claim 157, Lee teaches that the means for selecting comprising a means for irradiating the electric field regulator (Para. 0067).

hhh. Regarding claim 158, Lee teaches that the means for selecting comprises means for applying and external potential to the electric field regulator (Para. 0064-0065).

iii. Regarding claim 159, Lee teaches that the electric field regulator comprises an electrode (Element 242), and wherein the means for applying comprises means for depositing at least one electrode onto the electrode to apply a negative electrostatic potential to the third location (see Para. 0064).

jjj. Regarding claim 160, Lee teaches that the electric field regulator comprises an electrode (Element 242), and wherein the means for applying comprises means for removing at least one electron from the electrode to apply a positive electrostatic potential to the electric field regulation junction, the positive electrostatic potential increasing the ability of an electron to travel from the donor member to the acceptor member (see Para. 0071).

kkk. Regarding claim 161, Lee teaches a means for producing the electronic signal (see Fig. 1, at least).

lll. Regarding claim 162, Lee teaches an apparatus for regulating an electronic signal between first (Element 104) and second (Element 106) locations in a conductive nucleic acid material, the apparatus comprising an electric field regulator (Element 108) operable

to vary an electrostatic potential at a third location (Element 180) in the nucleic acid material interposed between the first and second locations.

mmm. Regarding claim 170, Lee teaches the first location comprises a location in a conductive nucleic acid electron donor member (Element 160), the second location comprises a location in a conductive nucleic acid electron acceptor member (Element 140), and the third location comprises at least one electric field regulation junction (Element 180) in electrical communication with the donor member, the acceptor member, and the electric field regulator.

nnn. Regarding claim 172, Lee teaches a method of regulating an electronic signal in a conductive nucleic acid material, the method comprising varying a degree of electric field regulation at an electric field regulation junction at which a regulator member intersects at least one of a plurality of members, each of the regulator member and said plurality of members comprising an oligonucleotide duplex and at least some of the regulator member and the plurality of members comprising a conductive metal-containing oligonucleotide duplex, the plurality of members comprising at least one donor member for receiving conduction electrons from an electron donor, and at least one acceptor member for communicating with an electron acceptor to provide a region of attraction for the conduction electrons (see Para. 0118).

ooo. Regarding claim 177, Lee teaches a method of storing data comprising selecting one of at least two states of an electric field regulator of a nucleic acid circuit element, each of said at least two states corresponding to a respective degree of electric field regulation at an electric field regulation junction in the circuit element, each said degree of electric field regulation corresponding to a respective data value (Para. 0122).

ppp. Regarding claim 180, Lee teaches that the nucleic acid circuit element comprises a plurality of members, at least some of which comprise a conductive metal-containing oligonucleotide duplex, the plurality of members comprising at least one donor member for receiving conduction electrons from an electron donor, at least one acceptor member for communicating with an electron acceptor to provide a region of attraction for the conduction electrons, and at least one regulator member intersecting with at least one of the plurality of members to define the electric field regulation junction, the regulator member being in communication with the electric field regulator, and wherein selecting comprises causing the electric field regulation junction to apply the degree of electric field regulation to the electric field regulation junction, to represent the data value (see Para. 0124).

qqq. Regarding claim 181, Lee teaches that the causing comprises selecting one of a plurality of states of the electric field regulator, each of the states corresponding to a respective electrostatic potential at the electric field regulation junction (see Para. 0128).

rrr. Regarding claim 182, Lee teaches an organic data storage medium comprising an electric field regulator having at least two selectable states, each of the states corresponding to a respective degree of electric field regulation at an electric field regulation junction of a nucleic acid circuit element, each said degree of electric field regulation corresponding to a respective data value (Para. 0125).

sss. Regarding claim 183, Lee teaches that the organic data storage medium further comprises comprising the nucleic acid circuit element, the nucleic acid circuit element comprising a plurality of members, at least some of which comprise a conductive metal-containing oligonucleotide duplex, the plurality of members comprising at least one donor member for receiving conduction electrons from an electron donor at least one acceptor member for communicating with an electron acceptor to provide a region of attraction for the conduction electrons and at least one regulator member intersecting with at least one of the plurality of members to define the electric field regulation junction, for cooperating with the electric field regulator to apply the degree of electric field regulation to the junction, to represent the data value (see Para. 0126).

ttt. Lee teaches an apparatus for storing data comprising a conductive nucleic acid material comprising an electric field regulating junction (Element 180) and a means for varying a degree of electric field regulation at the electric field regulating junction in the circuit element, each degree of the electric field regulating corresponding to a respective data value (Para. 0126). The language of "means for" introduces language for

interpretation under 35 U.S.C. 112, sixth paragraph. The specification teaches the regulator member as a structure with function set forth by the claim, which is taught by Lee, as shown.

uuu. Regarding claim 189, Lee teaches an electrical conductor comprising an electron source electrically coupled to a conductive metal-containing nucleic acid duplex, the conductive metal-containing nucleic acid duplex comprising a first strand of nucleic acid and a second strand of nucleic acid, the first and the second nucleic acid strands comprising a plurality of nitrogen-containing aromatic bases covalently linked by a backbone, the nitrogen-containing aromatic bases of the first nucleic acid strand being joined by hydrogen bonding to the nitrogen-containing aromatic bases of the second nucleic acid strand, the nitrogen-containing aromatic bases on the first and the second nucleic acid strands forming hydrogen-bonded base pairs in stacked arrangement along the length of the conductive metal-containing nucleic acid duplex, the hydrogen-bonded base pairs comprising an interchelated divalent metal cation coordinated to a nitrogen atom in one of the aromatic nitrogen-containing aromatic bases, to form the electrical conductor, further comprising an electron sink electrically coupled to the conductive metal-containing nucleic acid duplex, wherein the electron source is a molecule capable of donating an electron to the conductive metal-containing nucleic acid duplex, and the electron sink is an electron acceptor molecule capable of accepting an electron from the conductive metal-containing nucleic acid duplex, and wherein the electron donor or the electron acceptor are adapted to be reversibly chemically modified to alter the

conductivity of the organic circuit element under conditions that preserve the conductivity of the circuit element (see Para. 0076-0083, for example).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Ben-Jacob (`482), Sen (`897), Connolly (`103), Watanabe (`333) and Ben-Jacob (Phys. Lett. A, Vol. 263) each teach transistor configurations with DNA molecules.

Contact Information

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW W. SUCH whose telephone number is (571)272-8895. The examiner can normally be reached on Monday - Friday 9AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kiesha Rose can be reached on (571) 272-1844. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Matthew W. Such/
Examiner, Art Unit 2891